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10/596,122	06/28/2006	Brenton Robert Steele	PIZZ-1005US	2370

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KNOBLE, YOSHIDA & DUNLEAVY  
EIGHT PENN CENTER  
SUITE 1350, 1628 JOHN F KENNEDY BLVD  
PHILADELPHIA, PA 19103

EXAMINER
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OLANIRAN, FATIMAT O

ART UNIT	PAPER NUMBER
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2614

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/596,122	<b>Applicant(s)</b> STEELE, BRENTON ROBERT	
	<b>Examiner</b> FATIMAT O. OLANIRAN	<b>Art Unit</b> 2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4,9,10,12 and 22 is/are allowed.
- 6) ☒ Claim(s) 1-3,5-8,11,13-21,23-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed 1/28/2010 have been fully considered but they are not persuasive. Feng explicitly discloses deriving different responses from microphones combinations (col. 4 line 1-40) and that the adaptive signal processing is applicable to microphones of various response patterns (col. 18 lines 30-37).

### ***Allowable Subject Matter***

1. Claims 4, 9-10, 12, 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and overcoming the 112 rejection as set forth below.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed,

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had possession of the claimed invention. Independent Claims 1, 20, 32, "...using a gradient method..." is not explicitly disclosed in applicant's original disclosure.

Furthermore there are many kinds of gradient methods and associated equations.

Applicant's claim amendment encompasses all types of gradient method. Applicant's original disclosure does not provide support for this.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-3, 5-8, 17-21, 23-25, 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feng et al (7076072) in view of Fischer (6751325)

Claim 1, Feng discloses a method executed by a processor for producing a combined adaptive directional signal, the method comprising deriving from two omni-directional microphones a first signal having an omni-directional polar pattern and a second signal having a bi-directional polar pattern (Fig. 3 and col. 4 line 19-30) and constructing the combined adaptive directional signal from a weighted sum of a first signal weight of the first signal and a second signal weight of a second signal (Fig. 6-7, 12 and col. 6 line

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13-30 col. 18 line 30-37), wherein the first and second signal weights are calculated to give the combined signal a constant gain in a predetermined direction and to minimize power of the combined signal (Fig. 6-7, 12 and col. 4 line 64-67 and col. 6 line 13-30). Feng does not explicitly disclose the second signal having a bi-directional polar pattern. However Feng discloses directional polar patterns and directional microphones (Fig. 3 and col. 18 lines 30-37).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to try various directional microphones in order to obtain a desired response pattern for different audio environments. In addition obtaining various directional responses from an omni-directional microphone is very well known in the art at the time of the invention as evidenced by Feng (col. 4 line 1-40) therefore it would have been obvious to one of ordinary skill in the art at the time of the invention that a directional response may be obtained from signal processing of pressure mics or directly from directional mics. In addition it would have been obvious to one of ordinary skill in the art at the time of the invention that design choice would determine the choice of microphones in order to obtain a desired pattern with available parts.

Feng does not explicitly disclose using a gradient method. Fischer discloses using gradient method in a microphone array for directionality and noise reduction (Fig. 3 and col. 5 line 40-47 and col. 2 line 17-25 ).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the microphones and processor of Feng with the filter of Fischer in

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order to generate a low noise directional signal for high quality audio pick up.

Claim 2 analyzed with respect to claim 1, Feng discloses wherein the weights are calculated in a non- iterative manner (col. 8 line 20-27).

Claim 3 analyzed with respect to claim 1, Feng discloses wherein the constant gain is provided by imposing a constraint that the first signal weight and the second signal weight add to a predetermined value (col. 6 line 51-60).

Claim 5 analyzed with respect to claim 1 wherein, wherein said signal weights are calculated for a series of frames, each frame having a predetermined length consisting N first signal samples and N second signal samples (Fig. 6-7, col. 8 line 21-40).

Claim 6 analyzed with respect to claim 1, 5 Feng does not explicitly disclose wherein  $N=64$ . However it would have been obvious to one of ordinary skill in the art at the time of the invention that design choice would determine the number of samples in order to provide a designer with a desired degree of fidelity.

Claim 7 analyzed with respect to claim 1, 5, Feng does not explicitly disclose discloses further including filtering or smoothing the series of weights to minimize frame-to-frame variation in the calculated weights.

Examiner takes Official Notice on the limitation smoothing the series of weights to minimize frame-to-frame variation in the calculated weights. Smoothing a weight, gain

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or coefficient value in order to avoid artifacts or abrupt changes in an audio processing system is well known in the art at the time of the invention. Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the process of Fig. 7 in Feng with a weight smoothing processes in order to minimize artifacts.

Claim 24 analyzed with respect to claim 20 recites the limitations of 7.

Claim 8 analyzed with respect to claim 1, Feng discloses wherein the first and second signals are sampled, the signal weights being calculated for successive sets of said first and second signals samples (Fig. 6 and col. 8 line 20-40 and col. 9 line 1-4).

Claim 17 analyzed with respect to claim 1 Feng discloses wherein said first and second signals are frequency domain samples (Fig. 7 and col. 5 line 60-67 and col. 6 line 1-13).

Claim 18 analyzed with respect to claim 17, 1, Feng discloses further comprising calculating and applying the weights to several independent subsets of frequency domain samples, to give different directional responses at different frequencies and/or to allow selective suppression of different frequencies (col. 6 line 41-60 and col. 8 line 21-27).

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Claim 19 analyzed with respect to claim 1, Feng discloses comprising applying a frequency weighting function to said first and second signal before calculating said signal weights (col. 6 line 14-65).

Claim 20 Feng discloses an apparatus for producing a combined adaptive directional signal, the apparatus comprising apparatus including an analog-to-digital converter for producing from two omni-directional microphones a first signal having an omni-directional polar pattern and a second signal having a directional polar pattern ((Fig. 3 and col. 4 line 19-30 Fig. 6-7, 12 and col. 6 line 13-30 col. 18 line 30-37); and apparatus including a summation device for constructing the adaptive directional signal from a weighted sum of a first signal weight of the first signal and a second signal weight of a second signal wherein the first and second signal weights are calculated to give the combined signal a constant gain in a predetermined direction and to minimize power of the combined signal (Fig. 6-7, 12 and col. 4 line 64-67 and col. 6 line 13-30).

Feng does not explicitly disclose the second signal having a bi-directional polar pattern. However Feng discloses directional polar patterns and directional microphones (Fig. 3 and col. 18 lines 30-37).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to try various directional microphones in order to obtain a desired response pattern for different audio environments.



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In addition obtaining various directional responses from an omni-directional microphone is very well known in the art at the time of the invention as evidenced by Feng (col. 4 line 1-40) therefore it would have been obvious to one of ordinary skill in the art at the time of the invention that a directional response may be obtained from signal processing of pressure mics or directly from directional mics. In addition it would have been obvious to one of ordinary skill in the art at the time of the invention that design choice would determine the choice of microphones in order to obtain a desired pattern with available parts.

Feng does not explicitly disclose using a gradient method. Fischer discloses using gradient method in a microphone array for directionality and noise reduction (Fig. 3 and col. 5 lines 40-47 and col. 2 lines 17-25).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the microphones and processor of Feng with the filter of Fischer in order to generate a low noise directional signal for high quality audio pick up.

Claim 21 analyzed with respect to claim 20, Feng discloses including means to provide said constant gain by imposing a constraint that the first signal weight and the second signal weight add to a predetermined value (col. 6 line 51-60).

Claim 23 analyzed with respect to claim 20, Feng discloses including means for calculating said signal weights for a series of frames, each frame having a

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predetermined length consisting of N first signal samples and N second signal samples (Fig. 6-7, col. 8 line 21-40).

Claim 25 analyzed with respect to claim 20, Feng discloses including means for calculating said weights continuously for samples of said first and second signals (Fig. 6-7, col. 8 line 21-40).

Claim 32 recites the limitations of claim 1. See Feng, Fig. 7 and col. 5 lines 36-49, for limitations computer program, computer-readable storage medium.

6. Claims 11, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feng et al (7076072) in view of Fischer (6751325) in view of Masuda et al (5384843).

Claim 11 analyzed with respect to claim 1, Feng in view of Fischer do not explicitly disclose whereby said signal weights are calculated so as to construct an omni-directional combined signal when a total power in said first signal is below a certain value.

Masuda discloses whereby said signal weights are calculated so as to construct an omni-directional combined signal when a total power in said first signal is below a certain value (Fig. 10 and col. 9 line 21-46).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the mic array of Feng with the switch processing of Masuda in order to improve audio quality of the received signal.

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Claim 27 analyzed with respect to claim 20 recite the limitations of claim 11.

7. Claims 13-14, 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feng et al (7076072) view of Fischer (6751325) in view of Klinke (7120262).

Claim 13 analyzed with respect to claim 1, Feng and Fischer do not explicitly disclose wherein the first and second signals are derived from signals produced by two spaced omni-directional microphones, a front and a rear microphone, and said predetermined direction is the forward direction along the microphone axis.

However Feng discloses first and second signals are derived from signals produced by microphones, microphones of different patterns and different microphone arrangements and said predetermined direction is the forward direction along the microphone axis (Fig. 1-5 and col. 18 lines 30-37).

Klinke discloses first and second signals are derived from signals produced by two spaced omni-directional microphones, a front and a rear microphone (Fig. 1).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to try spherical and bidirectional patterns as Feng discloses various mic configurations and in order to facilitate audio pick-up for various environments.

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Claim 14 analyzed with respect to claim 13, 1, Klinke discloses wherein the second signal is provided by the difference between signals produced by the front and rear microphones, without the use of a delay element (Fig. 1 and col. 4 lines 25-36).

Claim 28 analyzed with respect to claim 20 recite the limitations of claim 13.

Claim 29 analyzed with respect to claim 20, recite the limitations of claim 14.

8. Claim 15 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feng et al (7076072) in view of Fischer (6751325) in view of Klinke (7120262) in further view of Knapp et al (7324649).

Claim 15 analyzed with respect to claim 13-14, 1, Feng in view of Fischer and Klinke do not explicitly disclose further comprising processing the second signal by means of an integrator element or an integrator-like filter before constructing the combined signal, thereby compensating for the attenuation of low frequencies and phase shifts introduced in the subtraction of the two omni-directional signals.

Knappe discloses further comprising processing the second signal by means of an integrator element or an integrator-like filter before constructing the combined signal, thereby compensating for the attenuation of low frequencies and phase shifts introduced in the subtraction of the two omni-directional signals (Fig. 1-2 and col. 1 line 31-37 and col. 4 line 47-54).

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Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the output of Feng with the low pass filter of Knapp in order to provide an improved quality audio output.

Claim 30 analyzed with respect to claim 20, 28 see claim 15

9. Claims 16,31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Feng et al (7076072) in view of Fischer (6751325) in view of Klinke (7120262) in further view of Warren (7471798).

Claim 16 analyzed with respect to claim 13-14, 1 Klinke does not explicitly disclose further comprising amplifying the signals produced by the front and/or the rear microphone before constructing the bi-directional signal, to ensure an equivalent gain between the microphones.

Warren discloses amplifying the signals produced by the front and/or the rear microphone before constructing the directional signal, to ensure an equivalent gain between the microphones (Fig. 14 and col. 11 lines 35-45).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the mic inputs of Feng with the matching of Warren in order to improve the accuracy of the beamforming process.

Claim 31 analyzed with respect to claim 20, 28 recite the limitations of claim 16.

10. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Feng et al (7076072) in view of Fischer (6751325) in view of Hoshuyama (5627799).

Claim 26 analyzed with respect to claim 20, Feng in view of Fischer do not disclose including a leaky integrator to perform a running sum on said first and second signal samples in order to address issues of numerical overflow system memory.

Hoshuyama discloses in the prior art a leaky integrator to perform a running sum on said samples in order to address issues of numerical overflow system memory (Fig. 3 and col. 5 lines 1-8).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the beam former of Feng with the filter circuitry of Hoshuyama admitted prior art in order to have a well known and therefore easy to implement method.

### ***Conclusion***

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FATIMAT O. OLANIRAN whose telephone number is (571)270-3437. The examiner can normally be reached on M-F 10:00-6 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

FO

/Vivian Chin/  
Supervisory Patent Examiner, Art Unit 2614